1200-73 Central Pulse Pressure and Proximal Aortic Stiffness Remain Unchanged During the Normal Human Menstrual Cycle

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Background: Both Estradiol (E) and endogenous Progesterone (P) have vasodilator effects. Despite the marked differences in their levels in the follicular and luteal phases of the normal menstrual cycle (MC), studies have shown no difference in brachial blood pressure (BP) between the two phases. This suggests that, either the vasodilation is only seen centrally or there is compensatory activation of the renin-angiotensin system (RAS). This study was designed to investigate central arterial changes and RAS activity in response to gonadal steroids variations during the MC.

Methods: We studied 13 healthy women (mean age: 29 ± 4 years) during the follicular (day 2 to 5), and luteal (day 18 to 24) phases of the MC. All women had regular MCs and none were taking oral contraceptives. Ovulation was confirmed by a luteal rise in P (P >5pg/ml). E and P, total renin, prorenin and active renin were determined at each phase. Central pulsatile hemodynamics were evaluated using calibrated carotid tonometry and central aortic Doppler flow. Two seated brachial BPs were measured by an automatic monitor and averaged.

Results:

	Follicular phase	Luteal phase	P
Progesterone (pg/ml)	0.6 ± 0.3	11.6 ± 4.1	<0.001
Estradiol (pg/ml)	33.6 ± 9.1	126.3 ± 43.3	<0.001
Total Renin (μu/ml)	124.0 ± 52.7	225.9 ± 80.8	<0.001
Prorenin (μu/ml)	120.8 ± 48.0	198.8 ± 71.6	<0.001
Active Renin (μu/ml)	10.7 ± 5.8	27.6 ± 16.6	<0.01
Aldosterone (ng/ml)	8.2 ± 7.0	18.0 ± 6.7	<0.001
Peripheral Systolic BP (mmHg)	109 ± 8	106 ± 10	0.52
Peripheral Diastolic BP(mmHg)	67 ± 8	66 ± 6	0.60
Peripheral Pulse Pressure (mmHg)	42 ± 6	41 ± 9	0.6
Central Systolic BP(mmHg)	99 ± 11	99 ± 11	0.8
Central Diastolic BP (mmHg)	57 ± 6	57 ± 7	1
Central Pulse Pressure (mmHg)	42 ± 9	41 ± 9	0.8
Characteristic Impedance Zc (dynes * s/cm^5)	179 ± 44	183 ± 64	0.8
Augmentation Index (%)	7.7 ± 8.9	7.2 ± 10.2	0.3
Carotid Femoral Pulse Wave Velocity (m/s)	5.4 ± 0.6	5.6 ± 0.8	0.3

Conclusion: Central arterial stiffness and both peripheral and central BPs did not differ between the follicular and the luteal phases of the MC, despite the significant changes in levels of endogenous E and P. These null findings may reflect a vasoconstrictive effect from activation of the RAS that offsets the vasodilatory effect of increased levels of E and P during the luteal phase of the menstrual cycle.

1200-74 Weight Loss Does Not Alter Sympathetically-Mediated Vascular Tone in Normotensive Obese Humans

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Background: Obesity is associated with sympathoactivation, as assessed by microneurographic muscle sympathetic nerve activity (MSNA). Weight loss has been shown to decrease MSNA. However, it is unclear whether MSNA reflects sympathetic vascular tone.

Methods: Forearm vascular resistance (FVR) responses to intrabrachial phentolamine (120 μg/min; sufficient to block vasoconstriction to norepinephrine) were used to evaluate the sympathetic contribution to basal vascular tone in 19 obese normotensive subjects (4 males; 39±2 yr) and 14 age and gender-matched lean subjects (3 males; 39±2 yr). Nitroprusside (10 μg/min) was used to evaluate vascular smooth muscle dilator responsiveness. Measurements were repeated in all obese subjects after 12 weeks of hypocaloric diet and orlistat treatment and in 8 lean subjects after 12 weeks of observation with no treatment.

Results: Baseline MSNA was significantly higher in obese than lean subjects, but phentolamine responses were similar. The hypocaloric diet significantly reduced body mass index (BMI), blood pressure and MSNA (table; *p<0.05 vs obese baseline). However, no significant effects of weight loss on vasodilatation to phentolamine and nitroprusside were observed. No significant changes were observed in lean subjects after 12 weeks.

Conclusion: Elevated MSNA in normotensive obese subjects, and decreases in MSNA with weight loss, do not translate into alterations in sympathetically-mediated vascular tone.

	BMI (kg/m^2)	Daytime mean ambulatory blood pressure (mm Hg)	Baseline FVR	Nitroprusside (% Δ FVR)	Phentolamine (% Δ FVR)	MSNA (bursts per minute)
Lean controls baseline	22±1*	91±2	3.3±0.2	-60±2	-58±4	22±1*
Obese baseline	35±1	92±1	2.7±0.2	-75±2	-58±2	30±4
Obese after weight loss	32±1*	89 ±1*	2.6±0.2	-72±2	-57±3	24±3*

1200-75 Determinants of Coronary Artery Compliance in Subjects With and Without Angiographic Coronary Artery Disease

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Objectives: To determine the factors contributing to the biomechanical properties of coronary arteries in people with and without angiographic coronary disease.

Background: The stiffness of the aorta is known to increase with increasing age and in the presence of coronary artery disease. However little is known about the mechanics of coronary arteries which may have important clinical consequences.

Methods: Intravascular ultrasound was used to determine the mechanical properties and plaque behavior in subjects with coronary artery disease (CAD) (n=38), those with chest pain but angiographically normal coronary arteries (Nx) (n=9) and those early (<2 weeks) post cardiac transplant (Tx) (n=14).

Results: Coronary arteries dilated during systole in all groups but cross-sectional compliance and distensibility were less in the proximal LAD in the CAD compared with the Nx and Tx group (Compliance; 1.2±0.2 x 10-2 vs 1.7±0.5 x 10-2 and 2.7±0.6 x 10-2 mm2 / mmHg (mean±sem) respectively, p<0.01 CAD vs Tx. Distensibility: 0.8±0.2 x 10-3 vs 1.7±0.5 x10-3 and 1.7±0.3 x 10-3 mmHg^{-1}, p<0.05 CAD vs Nx and Tx). Differences between CAD and Nx groups remained significant following adjustment for age. There was extensive plaque in the CAD group that correlated negatively with the lumen area (r^2=0.58, p<0.001) but minimal atheroma was present in the Tx group. In the CAD group plaque cross-sectional area diminished significantly during systole in both the LAD and circumflex arteries. Absolute changes were: 0.50± 0.30, 0.33±0.11 and 0.68±0.13mm2 in the proximal, distal LAD and proximal circumflex artery respectively. At both proximal sites this reduction was a significant determinant of cross-sectional compliance.

Conclusion: CAD patients have reduced coronary compliance and distensibility compared with patients with chest pain and angiographically normal arteries and those early post cardiac transplant. Mechanical properties of 'angiographically normal' segments of coronary artery thus depend both on age and the presence of atheromatous plaque.

1200-76 Obesity Is Associated With Increased Conduit Vessel Stiffness in a Community-Based Cohort: The NHLBI Framingham Heart Study

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Background: Obesity is associated with insulin resistance and systolic hypertension, which are related to conduit stiffness. Prior studies of anthropometrics and conduit vessel stiffness in various disease states have reported associations between vessel stiffness and height, weight and body-mass index (BMI). However, no prior study has assessed these relations in a large community-based cohort.

Methods: We evaluated anthropometrics and vessel stiffness by assessing carotid-femoral pulse wave velocity (PWV) in 820 subjects attending a routine exam at the Framingham Study. PWV was determined from sequential tonometry of the femoral and carotid arteries using the ECG as a fiducial point.

Results: Mean characteristics of the cohort included age 62±9 (range 37-86) years and PWV 10.5±3.8 m/s; 55% were female. Linear regression with age, gender and height, weight or BMI demonstrated that PWV was associated with increasing weight and BMI (Table), but not height. The relations persisted after adjustment for current systolic blood pressure.

Table. Change in PWV (m/s) per SD change in predictor variable.

Predictor	Mean	SD	β (95% CI)	P
Weight (kg)	76.4	13.3	0.47 (0.25-0.69)	0.0001
BMI (kg/m^2)	27.2	4.4	0.50 (0.28-0.72)	0.0001

Conclusion: In this large community-based cohort, obesity is associated with stiffer central conduit vessels, which may contribute to increasing systolic blood pressure and increased risk for cardiovascular events. Insulin resistance, which is common in obese adults, may mediate the increase in conduit vessel stiffness, providing a potential link between obesity, insulin resistance and systolic hypertension.

1200-77 Slow Flow on Distal Left Anterior Descending Coronary Artery Demonstrated by Transthoracic Doppler Echocardiography Predicts Pathologic Coronary Flow Dynamics

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Purpose :The aim of this study was to test whether transthoracic Doppler echocardiography can predict the pathologic flow of left anterior descending coronary artery (LAD).

Methods : We prospectively examined 200 subjects(age 56±12 yrs, M:F=123:77) underwent coronary angiogram. After obtaining the tubular color flow signals of distal LAD using an ultraband transducer (5-12 MHz) with a special preset program of a low velocity range, the peak diastolic velocity (PDV) was measured.

Results: 1. Retrograde flow was detected in 8 of 12 patients(67%) with TIMI 0 and TIMI 1 flow with collateral vessels. 2. PDV was 13.4±5.5 cm/sec in subjects with TIMI 1 flow, 15.1±6.8cm/sec in subjects with TIMI 2 flow and 22.1±11.8 cm/sec in subjects with TIMI 3 flow(p<0.01 versus TIMI 1 and 2 flow, respectively). 3. PDV of less than 13 cm/sec had sen-